MAT 1400: Midterm Exam **Name:** _____
February 27, 2019

Be sure to show your reasoning and solution process for each problem!

1. A field is 50 meters longer than it is wide. If the area of the field is 600 square meters, what are its dimensions? (Hint: $600 = (60)(10)$.)

2. Solve each equation or inequality.

   (a) $\sqrt{x^2} = 73$. (There are two solutions!)

   (b) $(x-1)^{-\frac{1}{2}} + (x-1)^{\frac{1}{2}} = 0$ (Hint: Factor out the common factor of $(x-1)^{-\frac{1}{2}}$.)

(c) $|x-2|<3$

(d) $(x-1)(x-2)\leq 0$

3. (a) Provide an equation for the circle of radius 2 with center $(2,1)$?

(b) Is the point $(5,5)$ inside, on, or outside the circle of radius 5 with center $(0,0)$?

4. (a) What is the equation of the line through the point $(1, 2)$ that is perpendicular to the line given by the equation $y = -\frac{1}{2}x + 73$?

   (b) Let the function $f : \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = x^2 + \frac{2}{x}$. What is $f(2)$?

5. *You need not simplify your answers to this question.*

   (a) Let the function $f : \mathbb{R} \to \mathbb{R}$ be defined by $f(x) = x^2 + \frac{2}{x}$. What expression represents $f(x + \Delta x)$?

   (b) We know that the area of a circle of radius r is given by the function $A = f(r) = \pi r^2$. What expression represents the area of a circle of radius $r + h$?